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ABSTRACT

The potential use of actual performance by high school students in college-level courses as a predictor of college achievement, rather than or in addition to Scholastic Aptitude Test (SAT) scores, was investigated. At Syracuse University Project Advance over 4,000 students a year in 80 high schools in four states participate in joint high school and college during their senior year in high school. Grade point average (GPA) in Project Advance courses was a a predictor of first semester college GPA in a stepwise multiple regression analysis for 1978, 1979, and 1980 Project Advance students who subsequently attended Syracuse University. Percentile of high school rank, SAT math scores, and SAT verbal scores were also analyzed. SAT verbal vocabulary scores and SAT verbal reading scores were included in a separate analysis for those students who had the additional SAT scores available. Consonant with past research, percentile of high school rank was a good predictor and SAT scores were not. The correlation between Project Advance GPA and first semester GPA was moderately high. Project Advance GPA was the best single predictor in one year, added significantly to percentile of high school rank in another year, and was not helpful at all in the third year. Overall, there was a decline in the amount of variability accounted for over the three-year period. It is concluded that high school performance is the best predictor of college achievement, and SAT scores are not very useful. The amount of variability accounted for by different predictors varies widely from college to college; therefore, colleges may want to determine the best predictor equation for admission criteria. (Author/SW)

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PREDICTING COLLEGE ACHIEVEMENT USING PERFORMANCE IN COLLEGE-LEVEL COURSES TAKEN IN HIGH SCHOOL, SAT SCORES, AND HIGH SCHOOL RANK

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ABSTRACT

The use of SAT scores to predict college achievement has become a controversial issue. This study looks at a potentially useful predictor of college achievement as a substitute for or in addition to SAT scores: actual performance by high school students in college-level courses. Many high school seniors are participating in joint high school-college programs during their senior year of high school. Syracuse University Project Advance serves over 4000 students a year in 80 high schools in four states. Grade point average in Project Advance courses was used as a predictor of first semester college grade point average in a stepwise multiple regression analysis for 1978, 1979, and 1980 Project Advance students who subsequently attended Syracuse University. Percentile of high school rank, SAT math scores, and SAT verbal scores were also included in the analysis. SAT verbal vocabulary scores and SAT verbal reading scores were included in a separate analysis for those students who had the additional SAT scores available.

Consonant with past research, percentile of high school rank was a good predictor and SAT scores were not. The correlation between Project Advance grade point average and first semester grade point average was moderately high. Project Advance grade point average was the best single predictor in one year, added significantly to percentile of high school rank in another year and was not helpful at all in the third year. Overall there was a decline in the amount of variability accounted for over the three year period.

It is concluded that high school performance is the best predictor of college achievement. SAT scores are not very useful. The amount of variability accounted for by different predictors varies widely from college to college.

It is therefore suggested that college officials conduct research at their own institutions to determine the best predictor equation for admission criteria. If a performance indicator for college-level courses taken in high school is available it might be useful in combination with high school performance.

PREDICTING COLLEGE ACHIEVEMENT USING PERFORMANCE IN COLLEGE-LEVEL COURSES TAKEN IN HIGH SCHOOL, SAT SCORES, AND HIGH SCHOOL RANK

The use of SAT scores to predict college performance and therefore to help in the decision making process of college admissions officers has recently become a controversial topic. The controversy has moved outside the realm of psychological and educational journals and has become an issue discussed by such well-known consumer advocates as Ralph Nader. Nader and others have complaints concerning the Scholastic Aptitude Tests: one of their questions is how well the SAT scores predict perfomance in college. The question is of major importance to college admission officials and students alike. How much weight should the SAT's carry in the decision to reject or accept a student? If SAT's are not a good predictor of achievement by themselves, are they useful with other indices? Are other indices more reliable?

Many studies have been conducted in the past twenty years to determine how well SAT scores predict college achievement. The results of these studies (unlike many fields of research) show fairly consistent results.

Larson and Scontrino (1976) conducted an eight-year study on approximately 1400 students from a "small West Coast University" (p.446). Using the four-year, cumulative college grade point average as the criterion, they found that a student's cumulative high school grade point average (GPA) was the best single predictor of college achievement. SAT scores added an average, over the years, of 4.7 percent in the amount of variability accounted for. Patricia Lunneborg (1977), also using cumulative college GPA at the University of Washington, found

the same pattern: high school GPA was a good predictor with SAT scores adding little.

First semester or first year grade point averages are often used as criteria in predictor studies. Aleamoni and Oboler (1978) studied over 4000 students at the University of Illinois at Urbana-Champaign. They, too, found that high school GPA was the best single predictor of first semester GPA; SAT scores added very little. Chissom and Lanier (1975) used first semester GPA at Georgia Southern College and again found high school GPA to be the best predictor, with SAT math adding about 10 percent and SAT verbal adding 2 percent.

An extensive study by Lins, Abell, and Hutchins (1966) at the University of Wisconsin, Madison looked at many variables, including high school GPA and percentile of high school rank, as predictors of first semester GPA. Their findings agreed with those already cited. They also concluded that high school GPA and the percentile of high school rank were equally good predictors. In their study, analyzing the data by separating students according to school or college within the university resulted in better prediction.

Some researchers have reported a decline in the amount of variability accounted for with the traditional predictors of high school GPA and SAT scores over time. Michael and Jones (1963), using first year GPA as the criterion, found that a decline in prediction occurred during a five-year period at the University of Southern California. An additional finding was that the achievement of the women was more predictable than that of the men. Dalton (1976) replicated the Michael and Jones study at Indiana University using first semester GPA as the criterion. From 1961 to 1974, the amount of variability accounted for dropped from 62 percent to 47 percent for men and from 64 percent to 49 percent for women. Dalton rules out the possibility that a restriction of range, resulting from decreases in standard deviations over the years, is the cause of the declining prediction.

One of the most recent articles in professional journals on the SAT controversy was published by Slack and Porter (1980) in the Harvard Educational Review. An extensive review of the SAT literature, part of their article deals with the issue of how well SAT scores predict achievement. Slack and Porter cite additional studies showing, again, that high school performance (high school rank) is the best single predictor, with SAT scores adding little.

So why are SAT scores still being used? One reason may be that universities are hesitant to base their admission decisions solely on high school grade point average or high school rank. Even with overwhelming evidence that high school achievement is the best predictor, it does not account for all of the variability in college performance. So a search is still on, as it should be, for additional predictors that can be used in effective combination with high school performance indicators.

A potentially useful predictor of college achievement, and one which has received relatively little attention, is the actual performance by high school students in college-level courses. For increasing numbers of students, such performance indicators are available. Many students are participating in a variety of joint high school-college programs during their senior year of secondary school. Syracuse University Project Advance, currently the largest program of this type, annually serves over 4,000 students in 80 high schools located throughout New York, Massachusetts, Michigan, and New Jersey. In these 80 schools, students may take carefully developed and supervised college courses taught by high school faculty who also hold adjunct instructor status at Syracuse University. Students successfully completing Syracuse University Project Advance courses can then apply to have their Syracuse University credits transferred to the institution they later attend. Approximately 20,000 students have participated in the program since 1973 and have transferred credit to over 350 post-secondary institutions.

This study was undertaken to determine how well performance in Project Advance courses predicts subsequent college achievement, and how Project Advance performance relates to SAT scores and high school rank.

METHOD

Students who participated in the Project Advance program during 1977-78, 1978-79, and 1979-80 and subsequently attended Syracuse University were chosen as subjects because of the number of subjects available and the accessibility of their academic records. In the 1977-78 (referred to as 1978) class there were 39 male and 45 female students, for a total of 84. The 1979 class had 61 male and 33 female students for a total of 94, and the 1980 class had 65 male and 45 female students for a total of 110. The following data were collected for each year: SAT math scores (SATM), SAT verbal scores (SATV), percentile of high school rank (PCT), first semester grade point average (FSGPA), and Project Advance grade point average (PAGPA). Missing data resulted in a smaller number of observations for the regression analyses, as noted in the tables. For students who had available SAT verbal vocabulary (SATVV) and SAT verbal reading (SATVR) scores, an additional regression analysis was performed including these two variables.

RESULTS

Means and standard deviations for all variables over the three years are presented in Table 1. Most of the scores are fairly stable from year to year. The SAT scores show the most mean fluctuation. Project Advance grade point average, first semester grade point average, and percentile of high school rank show very little mean change. The standard deviations are also stable for all of the measures across the years.

The pattern of correlation noticeably changes, however, over the three classes. Table 2 contains the intercorrelations for the variables. The last column of the table contains the correlations of each of the variables with the first semester GPA. In the 1978 class, percentile of high school rank has the highest correlation with first semester GPA ($r = .63$), followed by Project Advance GPA ($r = .50$). In the second year, Project Advance GPA has the highest correlation with first semester grade point average ($r = .60$), followed by percentile of high school rank ($r = .43$). In the third year, SAT verbal reading has the highest correlation ($r = .60$), followed by SAT verbal vocabulary ($r = .55$).

To see how the variables acted together, a stepwise multiple regression (maximum R^2 solution) was performed using first semester GPA the criterion and percentile of high school rank, Project Advance GPA, SAT math score, and SAT verbal score as predictors for each year of data. The maximum R^2 routine (SAS, 1979) first determines the best one-variable model, then the best two-variable model, and so on, regardless of the order in which the variables are entered. Table 3 shows the models chosen by the program for each year and their resulting R^2 values.

Percentile of high school rank was a good predictor of first semester achievement in the 1978 class, accounting for 42 percent of the variability. SAT math added 3 percent and Project Advance GPA added another 2 percent. SAT verbal, adding less than 1 percent, was not an effective predictor. Overall, almost half of the variability in first semester GPA was accounted for. The 1979 data, however, were not as predictable. Project Advance GPA was the best predictor for this year, accounting for 29 percent of the variability. SAT math added 15 percent more. Percentile of high school rank and SAT verbal were not much use, each adding less than 1 percent. Overall, about 35 percent of the variability in the first semester GPA was accounted for.

In the 1980 class, predictive power was even less. Percentile of high school rank was the best single predictor, but it only accounted for 15 percent of the variability. SAT verbal added 5 percent. SAT math and Project Advance GPA were of little use, each adding less than 1 percent. Overall, 20 percent of the variability was accounted for.

As mentioned earlier, some students had available SAT verbal vocabulary and SAT verbal reading scores, and these variables were included as predictors in another analysis. Table 4 shows the models chosen by the program and the R^2 values for the variables over the three years. The patterns were essentially the same for these subgroups but the amount of variability increased, probably due to the use of subgroups and to an increase in the number of variables. For the 1978 class, percentile of high school rank and Project Advance GPA add the largest amount of predictabililty, contributing to a total R^2 of .584 for the variables. For the 1979 class, Project Advance is the most important variable contributing 31 percent to a total R^2 for the variables of .387. In the 1980 class, percentile of high school rank is the most significant variable, contributing to a total R^2 of .477 for the variables. Keep in mind that the number of observations for the analysis including SATVV and SATVR scores is less than half the total number of subjects in each class, lowering the reliability of this analysis.

DISCUSSION

The results of the present study parallel previous research. High school performance is a good predictor; SAT scores are not. In addition, a decline in the amount of variability accounted for by the variables over the years has occurred, as noted by Michael and Jones, and Dalton. Like Dalton, this study found that stable variability over the years rules out restriction of range as

a possible explanation. Other factors are contributing to the declining degree of prediction. The lower proportion of women in the 1979 and 1980 classes might explain some of the decline in predictive power. In the Michael and Jones study, as well as others, the college GPA of women was more predictable than that of men.

In addition to change in the amount of variability accounted for, the variables that best predicted achievement also changed from year to year. In the first and last year of the study, percentile of high school rank was the best single predictor, with SAT math and Project Advance GPA helpful in 1978 and SAT verbal helpful in 1980. In 1979, however, Project Advance GPA was the best single predictor and only SAT math was helpful. Percentile of high school rank and Project Advance GPA seemed to be the least stable predictors; sometimes they were excellent, other times they were not useful. SAT math and SAT verbal scores, although less changeable, were never really good predictors. The analysis including SAT verbal vocabulary and SAT verbal reading scores showed that these two variables were also not very good predictors, either alone or in combination with other variables.

Although Project Advance GPA was not always the best predictor, it outperformed SAT scores. The correlation between Project Advance GPA and first semester GPA was fairly high for the first two years and moderate for the third. If universities are looking for predictors other than high school performance to make admissions decisions, they may want to include performance in college-level courses taken in high school when such data are available.

Perhaps one of the most important conclusions that can be reached from this study, and from reviews of previous research, is that colleges and universities should conduct predictor research at their own institutions. The amount of variability accounted for differs significantly from college to college. At a

university where high school performance accounts for 60 percent of the variability of college achievement and other predictors add less than 2 percent, a decision might be made to drop the SAT's as an admission criterion. At a university where high school performance accounts for 20 percent of the variability, additional indicators should probably be employed. These could be more imaginative than the usual aptitude tests: in the Lins, et. al. study, the motivation report filled out by the high school principal proved to be a good predictor of college success.

In addition to preliminary research to identify useful predictors, colleges and universities should conduct evaluations every year or every few years to see if the usefulness of their predictors has changed. Changes in the proportion of male and female students and in the choice of majors could affect the predictability of college success. In the past few years more women have enrolled in post-secondary institutions and more students have enrolled in business and computer science programs. As Lins et. al. suggest, large univesities may want to determine useful predictor combinations by school or program subgroups rather than using one predictor equation for all students in the university.

Most important, institutions need to choose and monitor predictors that work for them rather than blindly relying on SAT scores which may not be adding much more to the predictability of college achievement than high school performance.

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TABLE 1

Means and Standard Deviations for all Variables for 1978, 1979, and 1980 Classes

VARIABLE	MEAN			STANDARD DEVIATION		
	78	79	80	78	79	80
SAT Verbal	498.29	518.90	511.00	98.52	82.86	75.05
SAT Math	552.07	574.73	564.82	88.87	87.34	97.32
SAT Verbal Vocabulary	523.00	517.50	492.50	102.15	90.45	80.99
SAT Verbal Reading	514.71	525.83	500.71	97.93	88.92	87.20
Percentile of High School Rank	79.22	81.90	79.64	15.74	17.24	17.34
Project Advance GPA	2.63	2.65	2.55	0.73	0.88	0.88
First Semester GPA	2.72	2.79	2.61	0.80	0.84	0.85

TABLE 2

Intercorrelations of all Variables for 1978, 1979, and 1980 Classes*

	SAT Math		SAT Verbal Vocabulary		SAT Verbal Reading		Percentile of High School Rank		Project Advance GPA		First Semester GPA	
SAT Verbal												
1978 n	.44	82	.95	50	.94	51	.39	57	.32	81	.40	82
1979 n	.51	91	.91	60	.94	60	.42	58	.31	90	.30	91
1980 n	.43	110	.85	56	.92	56	.35	87	.23	109	.43	110
SAT Math												
1978 n			.25[1]	50	.24[1]	51	.48	57	.25	81	.39	82
1979 n			.38	60	.45	60	.41	58	.32	90	.43	91
1980 n			.50	56	.51	56	.64	87	.39	109	.43	110
SAT Verbal Vocabulary												
1978 n					.83	50	.25[1]	38	.18[1]	49	.37	50
1979 n					.74	60	.29	40	.25[1]	59	.18[1]	60
1980 n					.74	56	.49	43	.43	56	.55	56
SAT Verbal Reading												
1978 n							.34	39	.33	50	.45	51
1979 n							.34	40	.34	59	.26	60
1980 n							.37	43	.37	56	.60	56
Percentile of High School Rank												
1978 n									.36	57	.63	59
1979 n									.57	57	.43	58
1980 n									.53	86	.47	87
Project Advance GPA												
1978 n											.50	82
1979 n											.60	93
1980 n											.31	109

*All correlations significant ($p < .05$) except those marked [1]

[1]Not significant ($p > .05$)

TABLE 3

Best Models and R^2 at Each Step of Multiple Regression for 1978, 1979, and 1980 Classes, SATVV and SATVR Not Included

	Best 1 Variable Model	Best 2 Variable Model	Best 3 Variable Model	Best 4 Variable Model
1978 n = 56	PCT R^2 = .424	PCT SATM R^2 = .457	PCT SATM PAGPA R^2 = .479	PCT SATM PAGPA SATV R^2 = .488
1979 n = 57	PAGPA R^2 = .287	PAGPA SATM R^2 = .339	PAGPA SATM PCT R^2 = .345	PAGPA SATM PCT SATV R^2 = .349
1980 n = 86	PCT R^2 = .153	PCT SATV R^2 = .200	PCT SATV SATM R^2 = .206	PCT SATV SATM PAGPA R^2 = .208

TABLE 4

Best Models and R^2 at Each Step of Multiple Regression for 1978, 1979, and 1980 Classes, SATVV and SATVR Included

	Best 1 Variable Model	Best 2 Variable Model	Best 3 Variable Model	Best 4 Variable Model	Best 5 Variable Model	Best 6 Variable Model
1978 n = 37	PCT R^2 = .436	PCT SATM R^2 = .492	PCT SATM PAGPA R^2 = .548	PCT SATM PAGPA SATVV R^2 = .572	PCT SATM PAGPA SATVV SATV R^2 = .584	PCT SATM PAGPA SATVV SATV SATVR R^2 = .584
1979 n = 39	PAGPA R^2 = .314	PAGPA SATM R^2 = .368	PAGPA SATM PCT R^2 = .369	PAGPA SATM SATV SATVV R^2 = .370	PAGPA SATM SATV SATVV SATVR R^2 = .382	PAGPA SATM SATV SATVV SATVR R^2 = .387
1980 n = 43	PCT R^2 = .381	PCT SATV R^2 = .468	PCT SATV SATM R^2 = .472	PCT SATV SATM SATVR R^2 = .474	PCT SATV SATM SATVR PAGPA R^2 = .477	PCT SATV SATM SATVR PAGPA SATVV R^2 = .477